Claims

1.   A component mounting apparatus comprising:

a nozzle for holding a component at its lower end, said component being supplied from a component supply unit;

a nozzle elevating means for moving said nozzle up/down;

a nozzle moving means for moving said nozzle horizontally;

obstacles higher than a height with which said component is picked up from said component supply unit or a height with which said component is to be mounted on a board conveyed by conveyance rails; and a

control means for controlling said nozzle elevating means and said nozzle moving means so that said component moved by said nozzle moving means is mounted on said board;

wherein said control means stores positions and heights of a plurality of said obstacles disposed between said component supply unit and said board; and when said nozzle having picked up said component in a position to pick up said component from said component supply unit is to move to a position to mount said component on said board, said control means locates said nozzle at a height high enough not to interfere with a first one of said obstacles and then moves said nozzle to a height high enough not to interfere with a next one of said obstacles in sync with the time when said nozzle has finished passing over said first obstacle.

2.   A component mounting apparatus according to Claim 1, wherein: said obstacles include at least one of a component camera for photographing said component from below said nozzle, one of said conveyance rails for conveying said board, a nozzle station for storing spare nozzles, and a reference mark provided between said component supply unit and said board and for performing position correction; and after said component has been photographed by said component camera, said nozzle is moved down in sync with the time when said nozzle has finished passing over said component camera, said nozzle is moved down in sync with the time when said nozzle has finished passing over said conveyance rail, said nozzle is moved down in sync with the time when said

nozzle has finished passing over said nozzle station, or said nozzle is moved down in sync with the time when said nozzle has finished passing over said reference mark.

3.   A component mounting apparatus comprising:

a nozzle for holding a component at its lower end, said component being supplied from a component supply unit;

a nozzle elevating means for moving said nozzle up/down;

a nozzle moving means for moving said nozzle horizontally;

obstacles higher than a height with which said component is picked up from said component supply unit or a height with which said component is to be mounted on a board conveyed by conveyance rails; and

a control means for controlling said nozzle elevating means and said nozzle moving means so that said component moved by said nozzle moving means is mounted on said board;

wherein said control means stores positions and heights of a plurality of said obstacles disposed between said component supply unit and said board; and when said nozzle having picked up said component in a position to pick up said component from said component supply unit is to move to a position to mount said component on said board, said control means determines a horizontal path to allow said nozzle to move to a component mounting position on said board while keeping a predetermined height, and moves said nozzle in said horizontal path.

4.   A component mounting apparatus comprising:

a nozzle for holding a component at its lower end so as to mount said component on a board, said component being supplied from a component supply unit;

a nozzle elevating means for moving said nozzle up/down;

a nozzle moving means for moving said nozzle horizontally; and

a control means for controlling said nozzle elevating means and said nozzle moving means so that said component moved by said nozzle moving means is mounted on said board;

wherein said control means controls said nozzle elevating means so that said nozzle approaches a component mounting region movement height close to said board

23

when said nozzle has arrived in a component mounting region above said board; and said control means controls said nozzle moving means so that said nozzle holding said component at said component mounting region movement height is moved to a component mounting position on said board so as to mount said component from said component mounting region movement height to said component mounting position.

5.   A component mounting apparatus according to Claim 4, wherein board marks provided on end portion sides of said board are recognized, and said component mounting region is calculated based on said recognized board marks.

6.   A component mounting apparatus according to Claim 4, further comprising: a conveyance rail movable in accordance with a width of said board to be conveyed; and a position detection means for detecting a position of said conveyance rail; wherein said component mounting region is calculated from information of said position of said conveyance rail detected by said position detection means.

7.   A component mounting apparatus according to any one of Claims 4 through 6, wherein said component mounting region movement height is a height defined in consideration of a height of each component mounted on said board, a height of said component held by said nozzle, and a gap necessary for said nozzle to move.

8.   A component mounting apparatus according to any one of Claims 4 through 7, wherein when said component is to be mounted from said component mounting region movement height to said component mounting position on said board, said control means drives said nozzle elevating means and said nozzle moving means simultaneously so as to move said nozzle in an arc moving trajectory.

9.   A component mounting method comprising the steps of:
using a nozzle to hold a component at its lower end, said component being supplied from a component supply unit;
moving said nozzle up/down and horizontally while avoiding obstacles higher than a height with which said component is picked up from said component supply unit or

24

a height with which said component is to be mounted on a board conveyed by conveyance rails; and

mounting said component on said board;

wherein positions and heights of a plurality of said obstacles disposed between said component supply unit and said board are stored; and

when said nozzle is to move from a position to pick up said component from said component supply unit to a position to mount said picked-up component on said board, a highest one is found from said plurality of obstacles, said nozzle is moved up to a height high enough not to interfere with said highest obstacle, said nozzle is moved horizontally, a current height of said nozzle is compared with a height of an obstacle said nozzle will pass over as soon as said nozzle has finished passing over said highest obstacle, and said nozzle is moved down to a height high enough not to interfere with said obstacle said nozzle will pass over when said nozzle is higher than the height of said obstacle.

10.   A component mounting method comprising the steps of:

using a nozzle to hold a component at its lower end, said component being supplied from a component supply unit;

moving said nozzle up/down and horizontally; and mounting said component on a board;

wherein said nozzle is made to approach a component mounting region movement height close to said board when said nozzle has arrived in a component mounting region above said board; said nozzle holding said component at said component mounting region movement height is moved to a component mounting position on said board; and said component is mounted from said component mounting region movement height to said component mounting position.

11.   A component mounting method according to Claim 10, wherein a horizontal movement operation and an elevating operation are performed simultaneously so as to move said nozzle in an arc moving trajectory when said component is to be mounted on said board.